

# TUHIN KUMAR RAUT

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## ACADEMIC DETAILS

Year	Degree/Board	Institution	CGPA/%
2025	B. Tech in Biochemical Engineering and Biotechnology	Indian Institute of Technology, Delhi	8.185
2021	Senior Secondary, CBSE	St. Xavier's Senior Secondary School	92
2019	Secondary, CBSE	Vyomayana Samstha Vidyalaya	97.4

## SCHOLASTIC ACHIEVEMENTS

- Department Rank 4 among 75 students in the Department of Biochemical Engineering and Biotechnology (2025).
- Received BOSS (Batch Of Seventy-Seven) Cash Award for demonstrating exceptional undergraduate research prowess (2025).
- Received grant from Emergent Ventures, Mercatus Center for working on Nanopore Protein Sequencing (2024).
- Won Silver medal at the International Genetically Engineered Machines (iGEM) Grand Jamboree held in Paris (2023).
- Secured 96.94 percentile among 150 thousand + candidates appearing for Joint Engineering Entrance - Advanced (2021).
- Secured 99.62 percentile among 1 million + candidates appearing for Joint Engineering Entrance - Mains (2021).
- Secured an All-India Rank of 462, among 50 thousand + students, in Kishore Vaigyanik Protsahan Yojana (KVPY-SA) (2020).
- One of 2000 students, among 1 million + students, to receive scholarship for the National Talent Search Examination (2019).

## BACHELOR'S THESIS

**MD Based Interaction and Translocation Analysis of Peptide through Nanopore** (Prof. Ishaan Gupta, DBEB, IIT D) Jul 2024 - Present

- Developed a fully automated Molecular Dynamics (MD) simulation platform for system preparation.
- Quantified various interaction networks formed by different types of protein analytes while passing through the pore, using various statistical and Markov state models.
- Developed a mathematical model for current output simulation of a nanopore to overcome computational limits of extended MD simulations.

## PROJECTS

- **Using AI to generate Novel Protein Sequences** (Prof. Vincenzo Carnevale, ICMS, Temple University) May 2024 – Aug 2024
  - Developed upon a Variational Autoencoder-based model to create a 3-dimensional latent space for the PF00520 family.
  - Made a logistic regression-based model to classify the different GO annotated proteins in the family.
  - Successfully generated novel protein sequences that were statistically indistinguishable from original sequences (based on their embedding distance on a Poincare ball hyperboloid).
- **Understanding Nicotine Addiction** (Prof. Tapan Kumar Nayak, KSBS, IIT D) Dec 2022 – May 2025
  - Simulated Acetylcholine unbinding from M2R-Go complex (PDB: 7T8X) using Force-Probe MD.
  - Analyzed GPCR dynamics: full structure vs. transmembrane region, to assess G protein impact on ligand unbinding.
  - Identified key residues, loop interactions, and binding pocket volume changes during unbinding.
  - Calculated unbinding energy via Umbrella Sampling to analyze high-energy change conformations.
- **Tunable Biosurfactant Production using Recombinant E. coli** (Prof. Preeti Srivastava, DBEB, IITD) Jun 2023 - Dec 2023
  - Performed MD simulation for the micelle formation by Rhamnolipid (Rha C10-C10) over copper ions and decane.
  - Engineered E. coli to produce Alasan and Rhamnolipid in a tunable manner, based on a bi-directional promoter system and characterized their potency using Oil Displacement Assay and Emulsification Index.
  - Presented the poster of “Tunable Biosurfactant Production using recombinant E.coli” in Biosphere, IIT-Delhi (2024).

## TECHNICAL SKILLS

- **Programming Languages:** - Python (Tensorflow, Keras, Pytorch, Pythae, Biopython, SciPy, Sci-Kit), Bash, HTML, LaTeX.
- **Tools and Softwares:** - GROMACS, NAMD, VMD, PyMOL, GeneRunner, SnapGene, BioRender, AWS.
- Familiar with working on High Power Computing Services and Local Servers in Linux Environment and Process Nodes Optimization.

## PUBLICATIONS

1. Tyagi, R., Srivastava, S., **Raut, T.K.**, Kartha, S., & Sharma, S., “A novel functional screening based method for generation of synthetic microbial community: Case study with control of Fusarium wilt in pigeonpea”, Plant Biology (PlaBio-2025-05-0287-RP.R1)
2. **Raut, T.K.**, Dhanoa, P., Jayakumar, A., Srivastava, P., & Sundar, D. (in press), “Recent advancements in the application of biosurfactants for the treatment of textile waste and industrial effluents.” In “Biosurfactants for a Sustainable Textiles Industry”, Royal Society of Chemistry.